

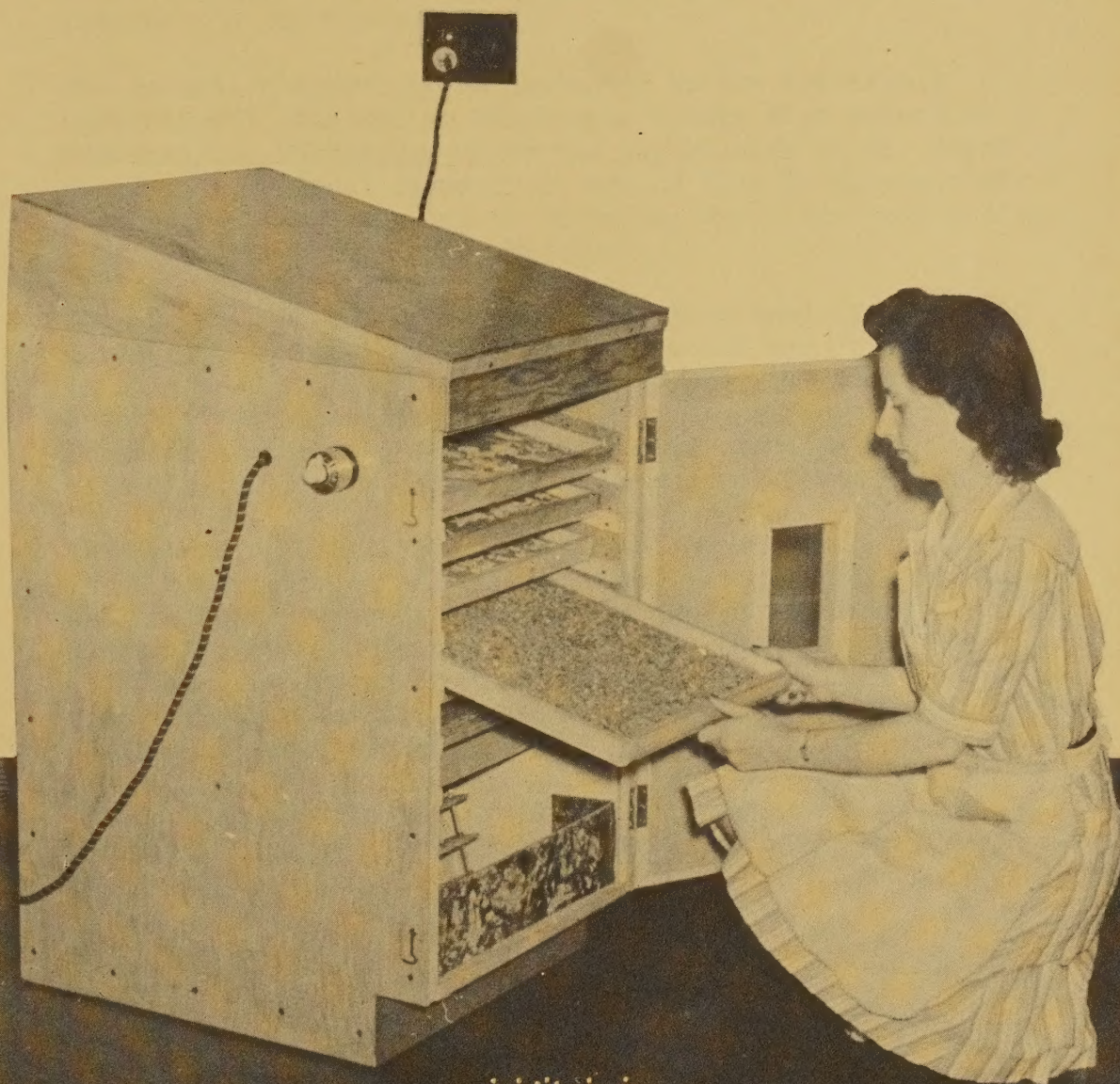
progress report on

ELECTRIC

DEHYDRATION

USING A HO-MADE DEHYDRATOR

1.933
P 945



USDA
LIB

COOPERATIVES' OPERATIONS DIVISION

Rural Electrification Administration • U. S. Department of Agriculture

Saint Louis 2, Missouri

AUG 9 1945

1000
1000

PREFACE

As a result of the demand for the preservation of food by dehydration, the Cooperatives' Operations Division of the Rural Electrification Administration began experiments early in 1942 in dehydrating fruits and vegetables in a home-made electric dehydrator.

The experimental work began with the construction of a simplified form of a table-top dehydrator using 1000 watts of electricity for the heat, and an eight-inch household fan for air circulation.

The Ho-made dehydrator was perfected by the vocational agricultural students at the Warren County High School in McMinnville, Tennessee, under the supervision of Mr. James Jagers, Vocational Instructor, and of Elva S. Bohannon of the Cooperatives' Operations Division, Rural Electrification Administration, St. Louis, Missouri.

This Ho-made electric dehydrator has been used in 111 field participation meetings where the women and men interested in this new, yet very old, method of food conservation actually do the entire job of dehydrating seasonal food. In fourteen months over 19,000 participants have used the Ho-made electric dehydrator under the supervision of Mrs. Bohannon.

This pamphlet constitutes a progress report based on the field experience gained through these participation meetings and has been prepared primarily for use of the Rural Electrification Administration. It is contemplated that additional progress reports will be made from time to time to report further developments and findings gained through additional field experience.

Inasmuch as the findings reported are preliminary, any comments or suggestions for further improvements will be appreciated.

INTRODUCTION

The preservation of foods by drying is one of the oldest methods of preservation known to man. In America it has been used since Colonial days. Drying in the sun is perhaps the oldest method of preservation that is still in use. In a few sections of the country where the climate is especially favorable, sun drying is still practiced to a considerable extent.

Every effort is being made to encourage families to produce and conserve food at home not only to meet their dietary needs but also to release additional food into commercial channels. As an important method of preservation dehydration should not be overlooked since very little critical material is involved in the construction of a dehydrator.

Dehydration, through the use of an electrically operated dehydrator, affords a quick, sanitary, and efficient means of food preservation. This method, however, should never be considered as a means of utilizing inferior products. If the foods are not good enough to can or freeze, they are not good enough to dehydrate. Food to be dehydrated needs the same care in preparation required if it were to be consumed at the time of preparation.

This progress report presents the steps involved in the construction and operation of the Ho-made electric dehydrator and a sulphuring box.

CONTENTS

CHAPTER I - Construction of Equipment

- a - Construction of the dehydrator
- b - Construction of the sulphuring box

CHAPTER II - Dehydration

CHAPTER III - Packaging and Storing

CHAPTER IV - Preparation for Table Use

- a - Revitalizing
- b - Cooking

CHAPTER I

CONSTRUCTION OF EQUIPMENT

A. Construction of the Dehydrator

The style of construction of the electric dehydrator shown is based on the assumption that it will be made in the vocational agriculture shop. The plan may be simplified for home construction without altering the basic design. The construction of this dehydrator calls for specific materials which may or may not be available. Scarcity of materials during wartime calls for ingenuity and aggressiveness on the part of the builder in substituting and salvaging used materials.

SAFETY PRECAUTIONS: In the construction of a dehydrator every precaution must be taken to avoid fire hazards. Fire-proof materials are absolutely essential in the construction of the heating chamber; under no circumstances should combustible materials be substituted for fire-proof materials as specified in the accompanying diagrams. Any electrical equipment purchased should comply with the National Electrical Safety Code.

Steps in Construction Procedure

The construction of the Ho-made electric dehydrator, the plans for which are presented in the accompanying drawings, involves the following major steps:

1. Cut the frames for the sides, back, and base shown in Detail Sheet No. 1.

NOTE: Measure the fan to be used from the blade center to the floor and change location of the intake ventilator hole Detail Sheet No. 1 item (5) if necessary in order that the fan is balanced directly in line with this ventilator. See also Detail Sheets 2 and 4 item (5).

2. Before cutting the frames for the door and top and the solid pieces above and below the door, one must know the thickness of the covering material to be used and change the measurements of these parts accordingly. The top and door are assembled and fastened in the same manner as the sides, back, and base.

3. The insulating material is now cut, placed on the frames and fastened, see Detail Sheet No. 1.

NOTE: The insulation around the element must be of fire-proof material. (Detail Sheet No. 2, items (7), (8), (10), (11)).

4. After the insulation is fastened to the side frames, the guide strips are cut, located, and fastened.

NOTE: The guide strips (Detail Sheet No. 2 strip under item (11)) exposed in the element chamber must be of fire-proof material.

5. The frames are now assembled and fastened together to form the cabinet.

NOTE: Detail Sheet No. 1 must be studied carefully since the insulating board has been placed on the frames so that each seam will be lapped for added insulation. The solid pieces are cut and fastened to the front above and below the door opening. The door and top are hinged in place.

6. The vertical baffle item (3), Detail Sheets No. 2 and 3, is cut and fitted so that it will slide easily to provide access to the fan and element.

7. The horizontal baffle item (11), fan diaphragm item (7), element base item (8), and deflector item (10), Detail Sheets No. 2, 3, and 4, are cut from fireproof material. The deflector and fan diaphragm are fastened permanently in place. The element base and horizontal baffle must be removable to check the fan and element.

8. Six of the trays item (13), Detail Sheets No. 2 and 4, give the dehydrator an approximate capacity of 1 bushel. It is recommended that each tray be constructed of 3/16" wooden strips set 1/8" apart.

9. A number of heating elements (1000 watts required) may be satisfactorily used. Among these are:

- a. The element item (15), Detail Sheet No. 2, constructed as shown by the wiring diagram, Detail Sheet No. 5, is made from 37 feet of No. 23 nichrome wire coiled on a 1/8" mandrel and stretched to approximately 9 feet. The panels of the element are from any nonconductive heat-resistant material available, such as porcelain insulators bolted together. The center of the coil is fastened to terminal post No. 4. The two ends are

threaded through the holes and fastened to terminal posts Nos. 1 and 6. The element should be spaced as evenly as possible to prevent over-heating in sections. The element is then bolted to the base item (8). The wires connecting the elements and switch must be asbestos-covered wire. The attachment cord is asbestos-covered heater cord. The fan is shown permanently connected in the circuit in order to assure that it will always be on when the heating element is on.

- b. Elements of known wattage from soil cable, toasters, irons, electric range elements, roaster elements, waffle bakers or brooders, may be used. Light bulbs item (16), Detail Sheet No. 5, wired in series to provide 1000 watts of heat or cone type elements also may be used.

The element either (a) or (b) above should be wired to a two circuit switch, the first position controlling the full 1000 watts and the fan, the second position, 500 watts and the fan.

- c. Portable commercial kits consisting of a fan, heating element, thermostat, and 6 feet of cord are now available. The portable commercial kit should be mounted on the upward sloping element base item (8), Detail Sheet No. 2, in order to secure the proper air flow.

Care should be exercised to secure a correct balance when installing the 8" fan which has been found from field experience to be well suited for the Ho-made cabinet. Securely tighten the set screw on the fan standard so that the air blows straight against the heating element. This is essential in order to assure an even flow of air.

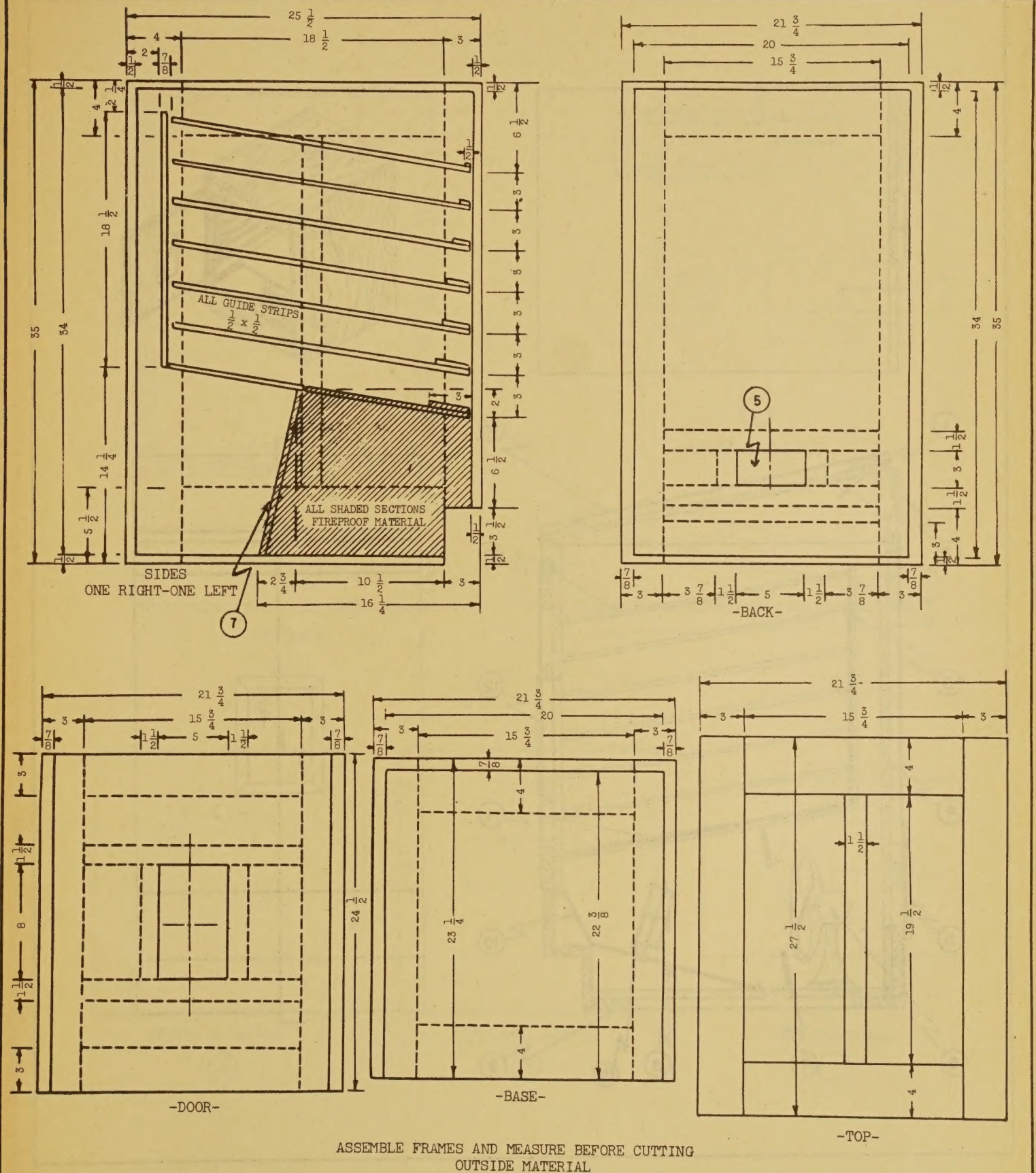
- 10. The top insert, item (1), Detail Sheets No. 2 and 3, in which is located the exhaust ventilator, item (2), is necessary for good air circulation. When the dehydrator is not in use, this insert may be removed in order to make an added piece of flat surface kitchen equipment.
- 11. The intake and exhaust ventilators, items (2) and (5), Detail Sheets No. 2 and 3, slide in molding and may be locked in any position with a wing nut on the bolt.
- 12. The double-pane door window, item (12), Detail Sheets No. 2 and 4, is framed on the outside for appearance. The door

is also provided with a knob and catch.

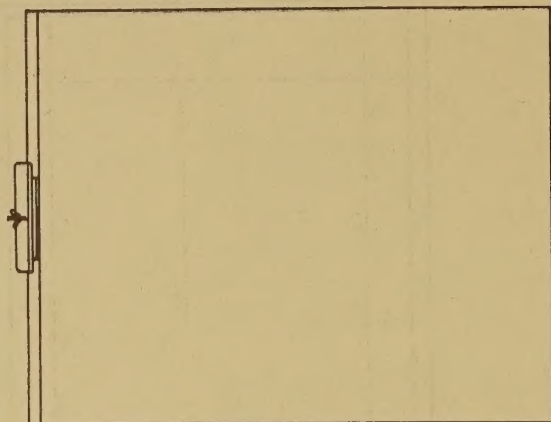
13. Four metal or rubber furniture glides on the base will save floor wear and increase handling ease.
14. The accompanying Bill of Materials reflects the materials actually used in the construction of the dehydrator model at the Warren County High School, McMinnville, Tennessee. This Bill of Materials includes parts required for the heating element described in part (a) of Step 9. Other types of heating elements, or salvaged used material, may be substituted but it is important that any substitutions be of similar quality, strength and durability in order to assure satisfactory performance.

CAUTION: Fire-proof material should be used in strict accordance with the plans and specifications.

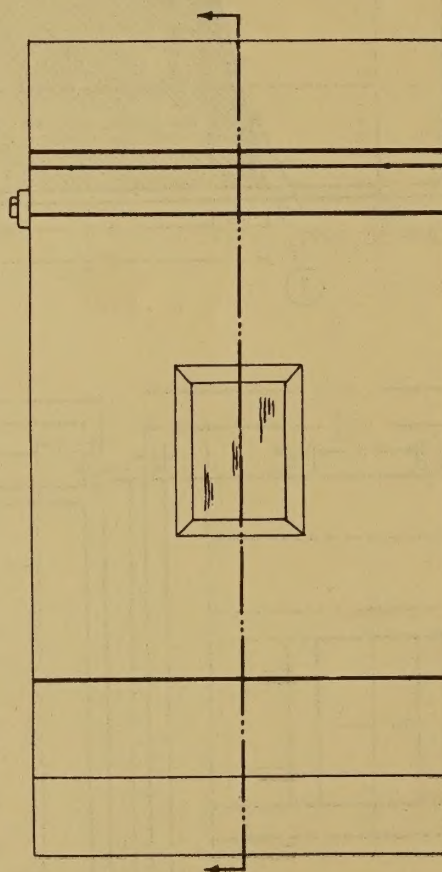
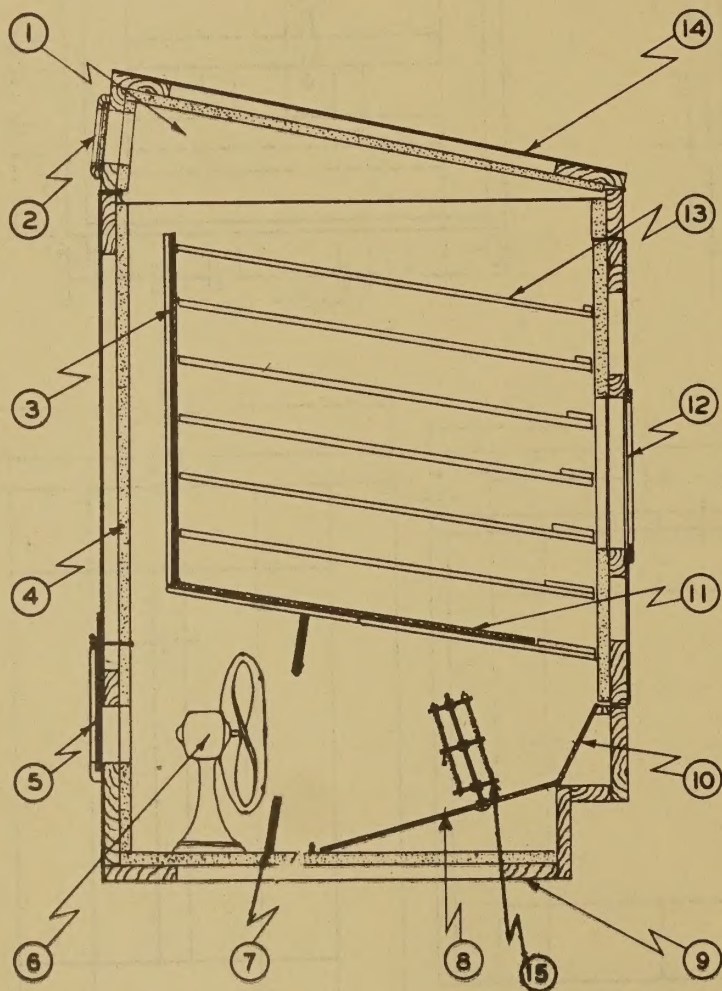
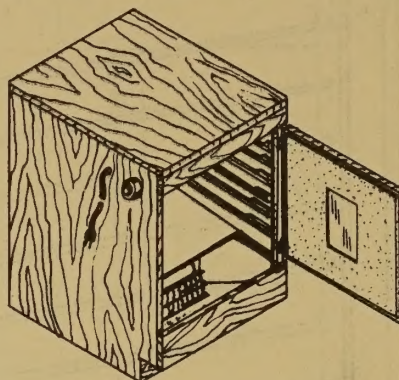
DETAIL NO. 1



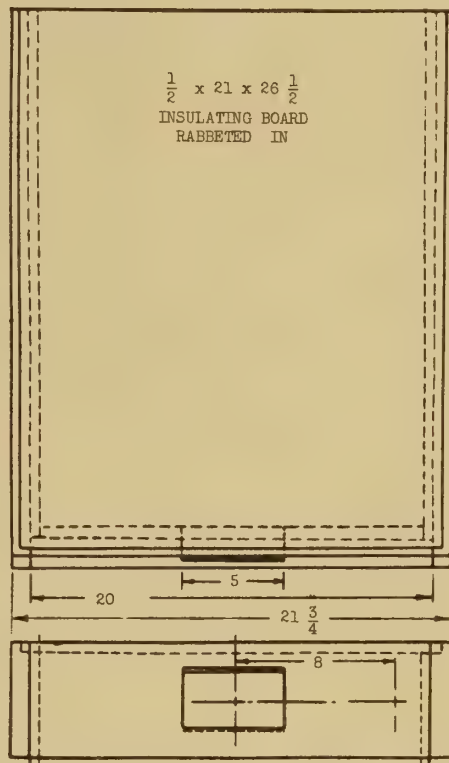
DETAIL NO. 2



WITH TOP INSERT REMOVED

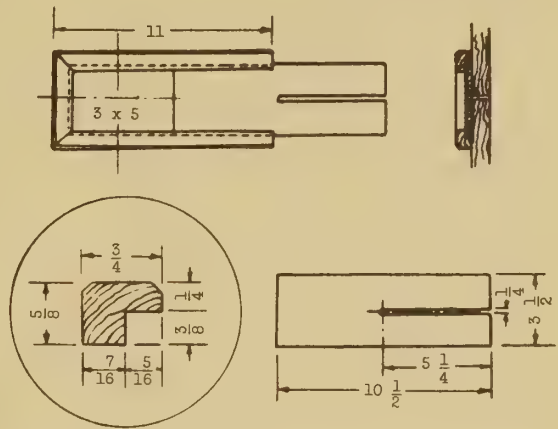


DETAIL NO. 3



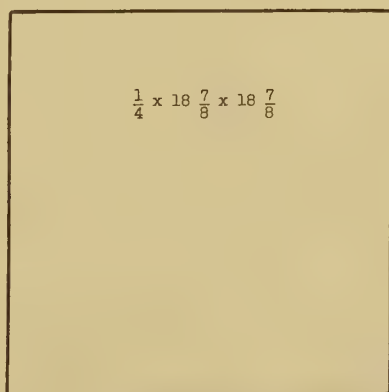
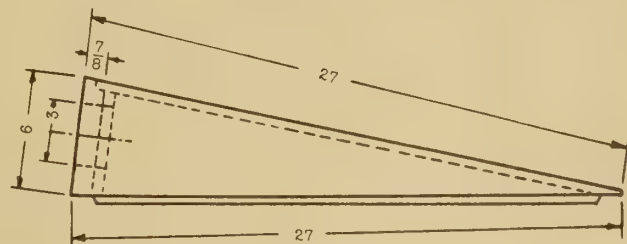
TOP INSERT

1



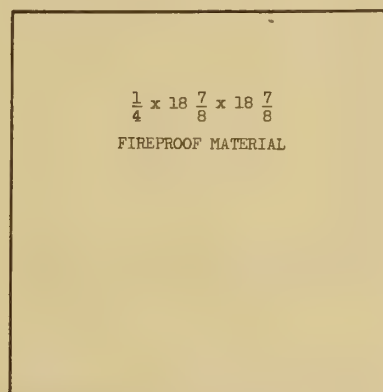
EXHAUST VENTILATOR

2



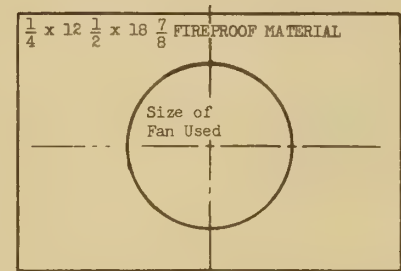
VERTICAL BAFFLE

3



HORIZONTAL BAFFLE

11



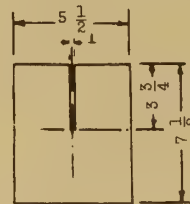
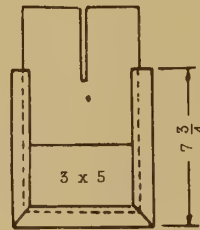
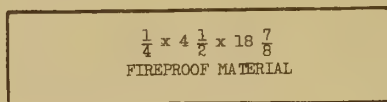
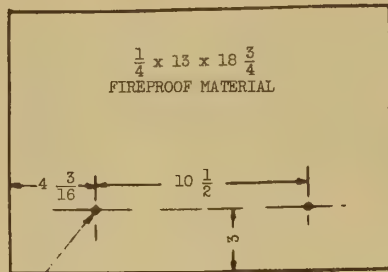
FAN DIAPHRAGM

7

DETAIL NO. 4

8

ELEMENT BASE

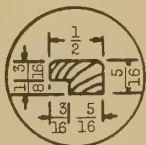
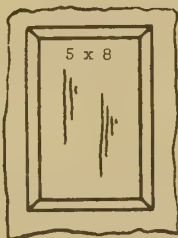
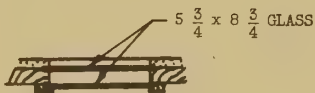


5

INTAKE VENTILATOR

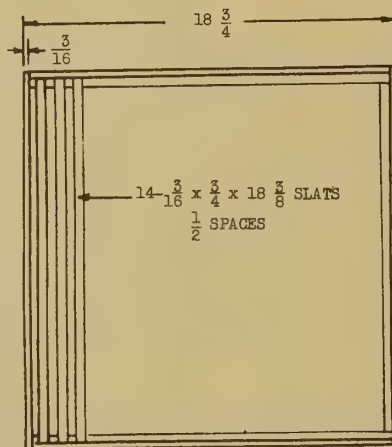
10

DEFLECTOR



12

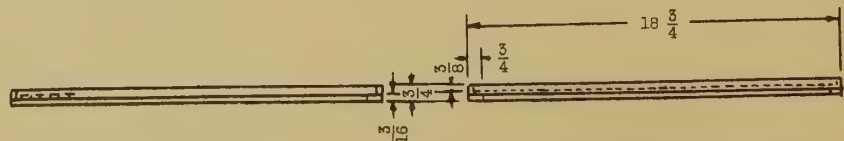
DOOR WINDOW



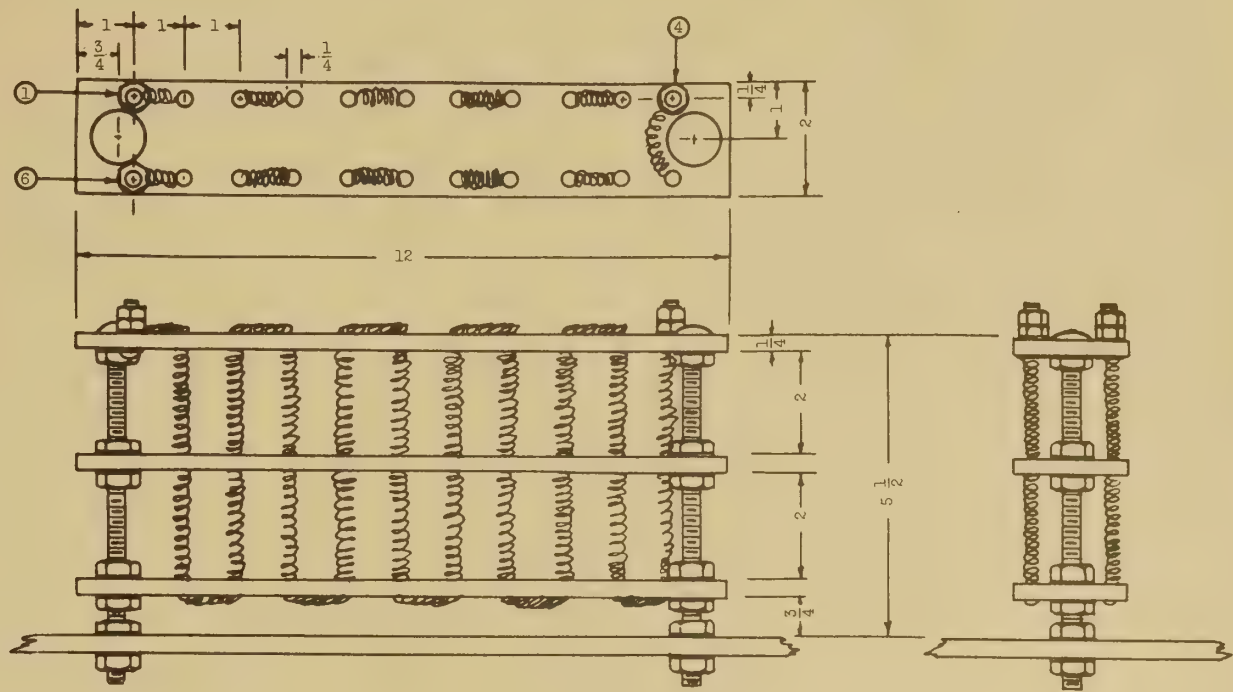
TRAYS
6 - REQUIRED

OPTIONAL
6 TRAYS WITH
HARDWARE CLOTH
BOTTOMS

13



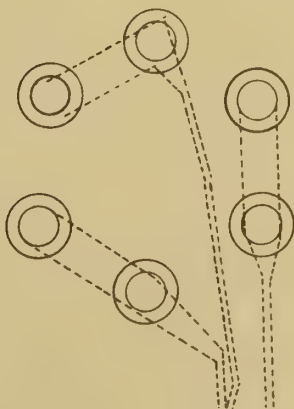
DETAIL NO. 5



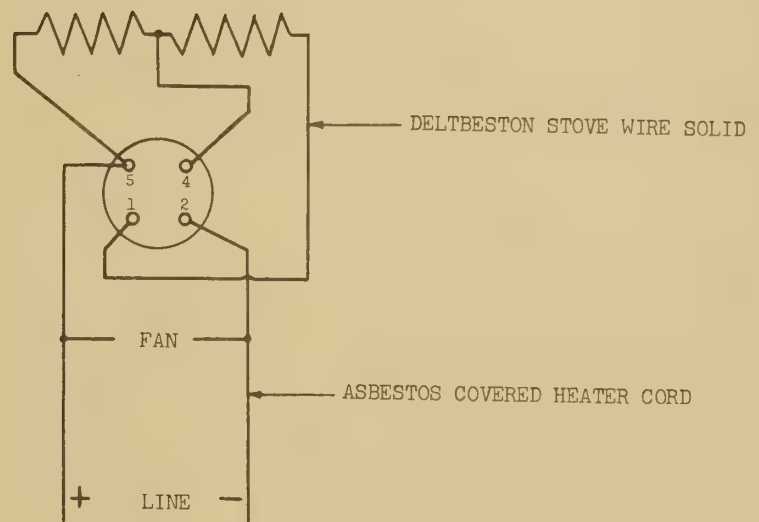
(15)

HEATING ELEMENT

G.E. THREE HEAT SWITCH
No. 278608
Shown



(16)



BILL OF MATERIALS

NAME OF PART	NO. REQD.	NAME OF PIECE	NO. REQD.	SIZE	DESCRIPTION OF MATERIAL
Side frame	2	Stiles	2	7/8" x 4" x 35"	Fir
		Rails	2	7/8" x 4" x 18-1/2"	Fir
		Stiles	2	7/8" x 3" x 31"	Fir
		Rails	2	7/8" x 5 1/2" x 18 1/2"	Fir
		Center stiles	2	7/8" x 1 1/2" x 25 1/2"	Fir
		Insulation	2	1/2" x 24 1/2" x 34"	Insulating Board
		Tray guide strips	12	1/2" x 1/2" x 22"	Poplar
		Tray guide stops	12	1/2" x 1/2" x (as shown)	Poplar
		Vertical baffle guide strips	2	1/2" x 1/2" x 18 1/2"	Poplar
		Horizontal baffle guide strips	2	1/2" x 1/2" x 15"	Fireproof material
		Horizontal baffle guide strips	2	1/2" x 1/2" x 10"	Poplar
		Fan diaphragm guide strips	2	1/2" x 1/2" x 13"	Poplar
		Unit chamber side	2	1/4" x 12" x 16 1/4"	Fireproof material
Back frame	1	Stiles	2	7/8" x 3" x 35"	Fir
		Top rail	1	7/8" x 4" x 15-3/4"	Fir
		Bottom rail	1	7/8" x 3" x 15-3/4"	Fir
		Cross rails	2	7/8" x 1 1/2" x 15-3/4"	Fir
		Cross stiles	2	7/8" x 1 1/2" x 3"	Fir
		Insulation	1	1/2" x 20" x 34"	Insulating board
Door	1	Stiles	2	5/8" x 3" x 24 1/2"	Fir
		Rails	2	5/8" x 3" x 15-3/4"	Fir
		Cross rails	2	5/8" x 1 1/2" x 15-3/4"	Fir
		Cross stiles	2	5/8" x 1 1/2" x 8"	Fir
		Insulation	1	1/2" x 20 1/4" x 24 1/2"	Insulating board
Base	1	Stiles	2	7/8" x 3" x 23 1/4"	Fir
		Rails	2	7/8" x 4" x 15-3/4"	Fir
		Insulation	1	1/2" x 20 1/4" x 24 1/2"	Insulating board
Top	1	Stiles	2	7/8" x 3" x 27 1/2"	Fir
		Rails	2	7/8" x 4" x 15-3/4"	Fir
		Center stile	1	7/8" x 1 1/2" x 19 1/2"	Fir
Front	1	Above door	1	7/8" x 2-3/4" x 22"	Fir
		Below door	1	7/8" x 3 1/2" x 22"	Fir
		Step top	1	7/8" x 2 1/2" x 22"	Fir
		Kick plate	1	7/8" x 5" x 22"	Fir
Top insert	1	Sides	2	7/8" x 6" x 27"	Fir
		Front	1	7/8" x 6" x 20"	Fir
		Top insulation	1	1/2" x 21" x 26 1/2"	Insulating board
		Side insulation	2	1/2" x 5 1/2" x 26"	Insulating board
		Front insulation	1	1/2" x 5 1/2" x 19"	Insulating board
Exhaust Ventilator	1	Ventilator	1	1/4" x 3 1/2" x 10 1/2"	Plywood
		Side molding	2	5/8" x 3/4" x 11"	Poplar
		End molding	1	5/8" x 3/4" x 5"	Poplar
		Bolt	1	1/4" x 3"	Standard carriage bolt

BILL OF MATERIALS

NAME OF PART	NO. REQD.	NAME OF PIECE	NO. REQD.	SIZE	DESCRIPTION OF MATERIAL
Exhaust ventilator		Wing nut	1	1/4"	Standard wing nut
		Washer	1	1/4"	Standard
Vertical baffle	1	Vertical baffle	1	1/4"x18-7/8"x18-7/8"	Fireproof material
Horizontal baffle	1	Horizontal baffle	1	1/4"x18-7/8"x18-7/8"	Plywood
Fan diaphragm	1	Fan diaphragm	1	1/4"x12 1/2"x18-7/8"	Fireproof material
Element base	1	Element base	1	1/4"x13"x18-3/4"	Fireproof material
Deflector	1	Deflector	1	1/4"x4 1/2"x18-7/8"	Fireproof material
Intake Ventilator	1	Ventilator	1	1/4"x5 1/2"x7 1/2"	Plywood
		Side molding	2	5/8"x3/4"x7-3/4"	Poplar
		Bottom molding	1	5/8"x3/4"x6"	Poplar
		Bolt	1	1/4" x 3"	Standard carriage bolt
		Wing nut	1	1/4"	Standard
		Washer	1	1/4"	Standard
Door window	1	End mold	2	5/16"x1/2"x5-5/8"	Poplar
		Side mold	2	5/16"x1/2"x8-5/8"	Poplar
		Glass	2	5-3/8"x8-3/8"	Single strength
Trays	6	Sides	2	3/16"x9/16"x18-3/4"	Poplar
		Ends	2	3/16"x9/16"x18-3/8"	Poplar
		Side supports	2	3/16"x3/4"x17 1/2"	Poplar
		End supports	2	3/16"x3/4"x18-3/4"	Poplar
		Slats	14	3/16"x3/4"x18-3/8"	Poplar
Heating element	1	Panels	3	1/4"x2"x12"	Nonconductive fireproof material
		Upright bolts	2	1/4"x6"	Carriage bolts thread entire lgth
		Terminal bolts	3	1/4"x3/4"	Standard machine bolt
		Washers	20	1/4"	Standard
		Nuts	20	1/4"	Standard hex nuts
		Element	1	37 feet	No. 23 nichrome wire
Fan	1	Fan	1	8" blade	A-C or O-C as required
Switch	1	Switch	1	120 volt	Three heat
		Connectors		10 feet	Delbaston stove wire #10 solid
		Attachment cord	1	8 feet	Asbestos covered heater cord
		Attachment plug	1		Standard
Hardware		Door hinges	2	3/4"x3"	Butt hinges, steel
		Top hinges	2	3/4"x3"	Butt hinges, steel
		Screws	24	#7-3/4"	Flat head, bright
		Door catch	1		Available style
outside covering		Top	1	1/4"x21-3/4"x27 1/2"	Plywood
		Sides	2	1/4"x28"x36"	Plywood
		Back	1	1/4"x22"x36"	Plywood
		Door	1	1/4"x22"x24"	Plywood
Miscellaneous		Thermometer	1		Dairy style 100° to 175° F.
		Thermostat	1		(optional) 140° to 160° F.

B. Construction of a Sulphuring Cabinet

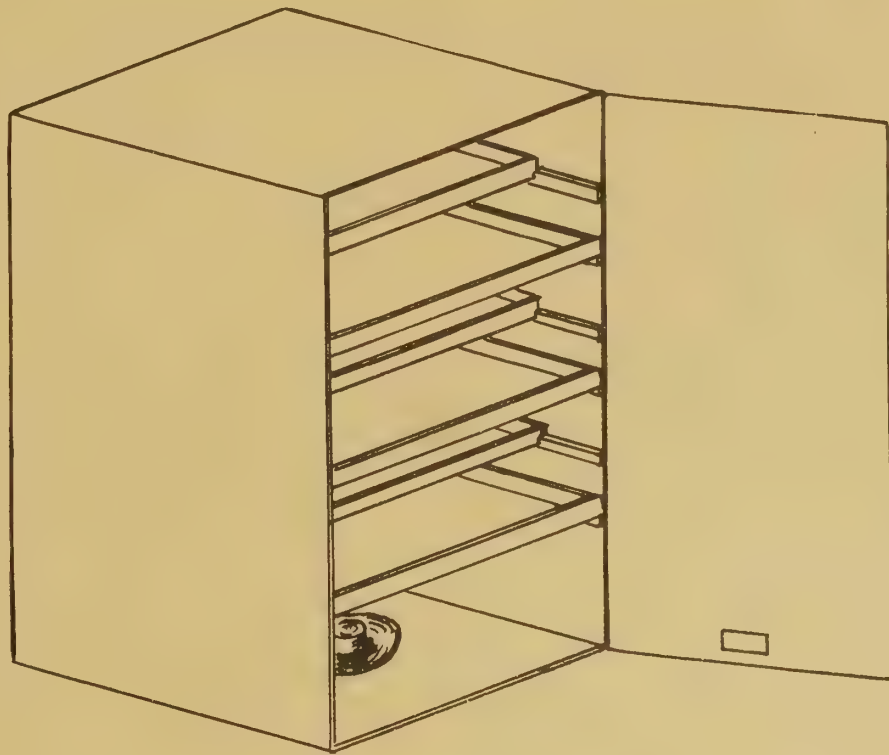
The sulphuring cabinet may be made from any reasonably air-tight box. The accompanying illustration shows the general dimensions and construction of a permanent sulphuring cabinet designed to take the wooden slat trays used in the dehydrator.

This cabinet may be constructed of a variety of materials and may be simplified to meet the needs of the individual user. Regardless of the type of sulphuring cabinet, it is important that provisions be made for the air intake similar to that shown on the accompanying illustration and that the cabinet be sufficiently air-tight to prevent escape of the sulphur fumes.

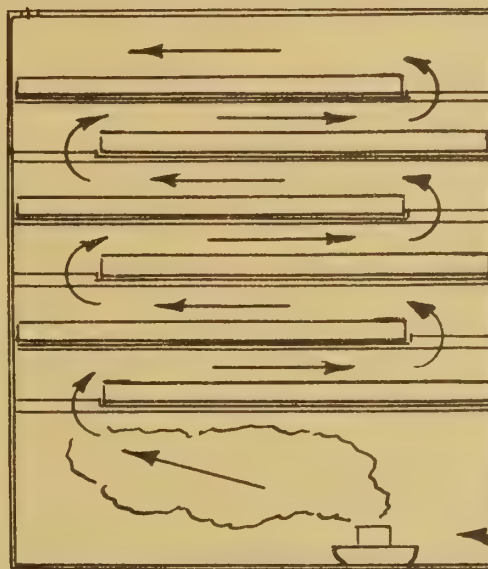
An improvised Ho-made sulphuring cabinet may be made by placing a corrugated box over the wooden trays. The trays should, of course, be raised off the ground at a sufficient height to permit the dish of sulphur to be placed on the ground under the bottom tray. Ordinary bricks or small blocks of wood may be used for this purpose. Better circulation of the sulphur fumes will be obtained if the trays are stacked one on top of the other in a zigzag manner.

IMPORTANT: The dehydrator must never be used as a sulphuring cabinet because the sulphur fumes will cause corrosion of the fan element and other metal parts and will also impregnate the porous walls of the dehydrator causing undesirable flavors to be absorbed by the food.

SULFURING CABINET



INSIDE DIMENSIONS
HEIGHT = APROX. 28"
WIDTH = WIDTH OF TRAY
LENGTH = LENGTH OF TRAY
PLUS 4 INCHES



1 X 2 INTAKE

ALWAYS USE IN OPEN

CHAPTER II

DEHYDRATION

Satisfactory dehydration of fruits and vegetables is dependent on the following three important steps:

1. Selection and Harvesting
2. Preparation - cutting, blanching and sulphuring
3. Dehydration - removal of moisture content

Information in regard to varieties of fruit, berries and vegetables that are best adaptable to dehydration in any locality may be obtained from Vocational Agricultural Teachers' Extension Service, State Agricultural Experiment Stations and other Agricultural Cooperating Agencies.

The food to be dehydrated should be harvested early in the morning before the sun withers the product. Select only firm, well-ripened, highly colored, well-flavored food. All processing should be done on the first day. If it is necessary to hold the food over, it should be washed and placed in a refrigerator or other cool place to prevent deterioration. As a safety precaution the dehydrator should be attended when in operation.

STEAM BLANCHING OR STEAMING

Steam blanching or steaming, as used in this report in connection with dehydration of vegetables - fruits to be dehydrated are rarely steam blanched - should not be confused with the term "water blanching" as used in canning. Vegetables to be dehydrated are usually steamed until the steam has thoroughly penetrated each piece of food, so that when broken open the food has a mealy or steamed through appearance. Approximate times for steam blanching of particular vegetables are presented in the section entitled "Special Information on Dehydration of Vegetables." An adequate blanch is necessary to reduce subsequent losses of carotene and Vitamin C in stored dehydrated products. Although the mechanism of the action of blanching is not completely understood, it results in much better retention of vitamins, flavor and color throughout the dehydration process and subsequent storage than dehydrating without blanching. Blanching inactivates certain enzymes, increases

the ease of revitalizing of some products, destroys bacteria, molds and other microscopic organisms."*

*U. S. Department of Agriculture Miscellaneous Publication #524, page 12.

BLANCHING EQUIPMENT AND PROCEDURE

Any large pan or kettle with a tight fitting lid such as wash boiler, preserving kettle, lard tin, canner, or steam pressure cooker, may be used for steaming. If a pressure cooker is used, the petcock should remain open and the lid should not be clamped down. Two or three inches of water, depending on the size of the container and the height of the rack, is poured into the vessel and heated to a vigorous boil. The food to be blanched then should be placed in a wire basket, cheesecloth bags or other thin material, and suspended above the vigorously boiling water. Wire racks and baskets may be made of $1/8$ " to 1" mesh hardware cloth.

The time required for steam blanching depends on the freshness, texture and size of vegetable pieces and the quantity being steamed at one time. The steam must thoroughly penetrate - but not cook - each piece of food so that when a sample is broken open it has a mealy or steamed through appearance. Uniform penetration is attained more easily when a relatively small quantity is placed in the wire basket; large quantities require a longer time for steam blanching and result in uneven penetration.

SULPHURING OR BLEACHING PROCEDURE

Except as noted below in "Special Information on Dehydration of Fruits," sulphuring of fruit before dehydration is essential to prevent discoloration, impairment of flavor and deterioration of quality. Sulphuring should be done out of doors. Freshly cut pieces of fruit such as apples, pears, apricots and peaches discolor when the protective peeling is removed and exposed to the air. This is caused by a chemical reaction which takes place between certain substances of the fruit tissues and oxygen, referred to as oxidation, enzymatic reaction, or the attack of enzymes. Noticeable results are the fading of the natural color or a decided browning of the fruit. To stop this oxidation the fruit should be placed immediately in salt water - one teaspoon salt to a pint of water - after cutting or removing the peel. The fruit should be kept in the salt water until it is given the sulphur treatment; it should be washed thoroughly in clear water before sulphuring. Distribute the fruit on the wooden slat trays so that the fumes will come in contact with

each piece of the fruit. One ounce (4 tablespoons) pure Flowers of Sulphur per bushel of fruit is placed in a shallow dish - not pan - under the bottom tray where it may be easily lighted with a match. Sulphuring should be as slight as possible to accomplish the desired results. Peaches and apricots require approximately 45 minutes for sulphuring; pears, 40 minutes; and apples 30 minutes and figs 15 to 30 minutes. Sulphuring is finished when the dark spots have disappeared, or when the juice seems to "ooze" from the fruit pores.

OPERATION OF THE DEHYDRATOR

In the operation of the dehydrator care should be taken to see that the fan is running when the heating unit is on. Should the fan stop, the heating unit should be turned off immediately. The control switch enables the operator to regulate the temperature during the dehydrating period. A dairy, or any thermometer registering from 100° to 175° Fahrenheit, should be hung inside the dehydrator, so that it may be observed through the glass in the door without the necessity of opening the door.

DEHYDRATION OF STEAM BLANCHED AND SULPHURED FOODS

The dehydration of steam blanched foods (vegetables) consists of the following steps:

Step 1: For all steam blanched foods the dehydrator must be preheated to a temperature not in excess of 150° Fahrenheit (sulphured foods may be started in a cold dehydrator). The period of preheating will be shortened by switching on the 1000 watts of heat. Before preheating, be sure both ventilators are closed. Sufficient time should be given in preheating the dehydrator so that the hot food may be taken directly from the steam blanch, placed in the trays and into the dehydrator. Care should be taken that the food does not cool between the steam blanch and the dehydrator. The food should be distributed evenly over the trays to assure even drying; food spread too deeply on the trays will require stirring and a longer period for drying.

Step 2: This step is very important in order to prevent undesirable case hardening. The ventilators and the door must be kept closed until the glass in the door shows a heavy accumulation (before it starts to drip) of moisture on the inside glass of the door window. It may take two hours, or longer, for this heavy accumulation of moisture to appear on the glass. This heavy accumulation of moisture results from the removal of water from the food and indicates that the process of dehydration is under way. Until this heavy accumulation appears, it is essential that the ventilators remain closed in order that the humidity, or pressure, is built up

in the box sufficiently to force the water out of the center of the food pieces.

Step 3: After the heavy accumulation of moisture appears on the glass, fresh air is admitted by gradually opening the top and bottom ventilators to permit the saturated air to escape slowly. The escaping air should feel damp and hot. At this time the heat should be reduced to 500 watts to prevent a rise in temperature. When the ventilators are opened the temperature should not be allowed to drop below the temperature specified for the particular food as designated in the following Sections entitled "Special Information on Dehydration of Vegetables" and "Special Information on Dehydration of Fruits." As the operator becomes experienced in the operation of the dehydrator, it will be unnecessary to maintain a constant check of the temperature. In order to avoid loss of heat and moist air, the dehydrator door should be opened only when absolutely necessary.

Step 4: As the dehydration process approaches completion, the temperature will gradually rise. Under no condition should the temperature be permitted to go above 160° Fahrenheit. The temperature is maintained by switching the heating element to the lowest wattage necessary to maintain adequate temperature and by adjusting the ventilators to regulate air intakes and discharge. The drying time for any particular food is dependent on a number of considerations such as freshness of product, method of preparation, thickness of slices, wedges or rings and the quantity being dried. The end of the drying period will be determined by the appearance of the product, the tendency for the temperature to rise above the maximum safe temperature, and the physical condition of the product.

SPECIAL INFORMATION ON DEHYDRATION OF VEGETABLES

The following vegetables should be dehydrated in accordance with the four steps given in the general instruction in the preceding section entitled "Dehydration of Steam Blanched and Sulphured Foods." The additional detailed information on specified vegetables presented in the following paragraphs is based on field experience obtained from 111 Participation Meetings and in many localities. The drying time indicated should be considered as ranges; in any particular instance the time required is dependent on the condition and preparation of the food; the operation of the particular equipment, and the experience of the operator. It is recommended that the new operator experiment with a small quantity of each variety of vegetables to become familiar with the operation of the dehydrator and determine the correct time for dehydration.

BEANS - GREEN OR GOLDEN WAX - Beans should be harvested early in the morning before the sun withers the product. Filled out, meaty pods with well developed beans that have attained about two-thirds of their maximum diameter have been found to be ideal for dehydration; under-developed pods do not make good dehydrated food. The beans should be washed thoroughly, the strings removed, and snapped into 1 inch lengths or sliced by cutting in half from end to end. Placed in a basket or thin cloth bag on rack above rapidly boiling water, the beans are steam blanched until each food particle is thoroughly penetrated. Thoroughly steamed beans when broken open will have a mealy-but not cooked - appearance. Steam blanching ordinarily requires 15 to 45 minutes, the time being dependent on the particular product. The blanched beans should then be spread 1/2" thick on trays and immediately placed in the dehydrator which has been preheated to 150° F. This temperature should be maintained throughout the drying period. Dehydration is carried out in accordance with Steps 1, 2, 3 and 4 under "Dehydration of Steam Blanched and Sulphured Foods." Strict observance of Step 2 is essential.

Field experience has revealed that the dehydration of beans ranges from 7 to 12 hours depending on the product and equipment used. The finished green product will be a very dark green in color; the golden wax will be a light yellow. When beans have finished dehydration a handful dropped on other beans in the tray will rattle like field ripened beans. After dehydration the beans should be placed immediately in moisture-proof bags as described in Chapter III "Packaging and Storing of Dehydrated Foods."

BROCCOLI - Broccoli to be dehydrated should be harvested early in the morning to assure freshness and should be select, with well filled out heads. Large bunches should be halved or quartered. After broccoli has been thoroughly washed, it should be inserted head down and allowed to stand in salt water - one tablespoon to the pint of water - for several minutes. It is then rinsed in clear water and steam blanched until the leaves and heads are wilted and the thickest portion of the stem has been thoroughly penetrated by the steam. This ordinarily requires 5 to 10 minutes. The broccoli should be spread thinly on the trays to assure uniform drying and placed immediately in the dehydrator which has been preheated to 150° F. The temperature should be held at 150° for the entire dehydration period and the dehydrator should be operated in accordance with Steps 1, 2, 3 and 4.

Field experience indicates, depending on local conditions, that the drying time ranges from 4 to 8 hours. When the process of dehydration is finished the stem and the buds are dry, the buds and leaves will be very dark green, and the stem will be a

creamy white. Broccoli should be stored in large size moisture-proof bags to prevent crushing or breaking the product. Described in Chapter III.

BEETS - Beets to be dehydrated should be of medium size. After the beets have been thoroughly washed and thinly peeled (a sharp stainless steel knife should be used for peeling); the beets may be cut into 1/8" rings, 1/4" shoe-string slices, or 1/2" cubes. It is desirable that the pieces be of uniform size in order to assure even drying. The beets are placed in a wire basket or colander, which may be placed in a shallow pan to catch the juice drippings for use in soup stock and other purposes, and steam blanched until each piece is thoroughly penetrated. Steam blanching requires from 6 to 10 minutes but may take considerably longer in individual cases. Beets cut in shoe-strings and cubes may be loaded on the trays to a depth of about 1/2"; slices should not, however, be overlapped. The trays are then placed in the dehydrator that has been preheated to 150° F. as described in Step No. 1 of "Dehydration of Steam Blanched and Sulphured Foods." The temperature should be held at 150° F. for the remainder of the drying period as explained in Steps No. 2, 3 and 4. Field experience indicates, depending on the product and other local conditions, that the time required for dehydration ranges from 7 to 10 hours. When dry the finished product will be leathery and may be somewhat crispy. The beets should be stored in moisture-proof bags as explained in Chapter III.

CABBAGE - Green, well-developed heads make a nice dehydrated product. The cabbage should be washed thoroughly and trimmed, using a stainless steel knife. As many of the outside tender, deep green leaves as possible should be saved. The cabbage may be either shredded or cut in quarters and the leaves separated. The separated leaves or shredded pieces are placed thinly on a rack or in a wire basket and steam blanched until the thickest portion has been thoroughly penetrated by the steam. This ordinarily requires 7 to 15 minutes. The steamed cabbage is distributed thinly over the trays to assure uniform drying and placed immediately in the dehydrator which has been preheated to 150° F. This temperature should be maintained for the first 4 hours, after which it should be reduced to 135° for the balance of the drying period. Follow steps No. 1, 2, 3 and 4. It is very important that the temperature should not rise above 130° F. at any time in

order to prevent undesirable caramelization which is the charring or burning of the food tissues and is indicated by a change in the original white, deep and bright green colors to brown according to the degree of caramelization.

Field experience indicates, depending on local conditions, a drying time ranging from 7 to 10 hours. The finished product will be dry - but not powdery dry - and will resemble in color the original green and white shreds or leaves. Dehydrated cabbage should be stored in large size moisture-proof bags to prevent crushing the larger leaves as explained in Chapter III.

CARROTS - Carrots to be dehydrated should be harvested early in the morning and should be smooth, highly-colored, and firm. They should be scrubbed thoroughly with a brush or rough cloth - it is not necessary to scrape strictly fresh carrots - and the larger upper half of the carrot is sliced into $1/8$ " rings, the tapering lower half into uniform shoe-string lengths. The carrots are then steam blanched until each piece has been thoroughly penetrated by the steam. This ordinarily requires 7 to 15 minutes. Steam blanched carrots are loaded on trays to a depth of $1/2$ " and placed in the preheated dehydrator in accordance with Step 1 of "Dehydration of Steam Blanched and Sulphured Foods." For the first 4 hours the temperature should be maintained at 150° F. and then reduced to 135° F. for the balance of the drying period. Steps Nos. 2, 3 and 4 under "Dehydration of Steam Blanched and Sulphured Foods" should be carefully observed. The drying time for carrots usually ranges from 7 to 10 hours. The finished product should be very dry, will be a bit deeper in color than the original yellow or orange, the round $1/8$ " slices will be tiny buttons, and the strips will be small strings. A small size, 3" x 5" moisture-proof bag should be used as described in Chapter III.

CELERY - Only celery that is fresh and crisp should be selected for dehydration. After removal of the leaves, which should be saved for seasoning powder or celery salt, the stalks should be washed and scrubbed thoroughly and cut into $1/4$ " slices. A small quantity of the slices are placed in thin cloth bags on the rack of the steamer above vigorously boiling water and steam blanched until the thickest portion has been penetrated by the steam. This usually requires 7 to 15 minutes. A thin cloth placed on the dehydrator trays will prevent the drying celery from falling through the slats of the tray. The blanched celery should be placed on the cloth covered trays to a depth of $1/2$ " and then placed in the preheated dehydrator as described in Step 1 of "Dehydration of Steam Blanched and Sulphured Foods." For the first 4 hours the temperature of the dehydrator should be maintained at 150° F. and then reduced to 135° F. following the procedure outlined in Steps 2, 3 and 4 of "Dehydration of Steam Blanched and Sulphured Foods." Drying time ranges

from 7 to 10 hours. When finished the celery should be green and white in color and crispy dry. It should be stored in small or medium size moisture-proof bags as explained in Chapter III.

CELERY LEAVES - Celery leaves should be steam blanched until they are thoroughly wilted. This usually requires 3 to 7 minutes. The dehydrator trays should be loaded thinly with the leaves and placed in the preheated dehydrator. Care should be taken to maintain the temperature at 150° F. throughout the drying period as explained in Steps No. 2, 3 and 4. The usual drying time ranges from 1-1/2 to 4 hours. The finished product should be a slightly deeper variegated green and white in color and be dry - but not powdery dry - for shredded leaf seasoning.

CELERY POWDER AND SALT - Celery powder may be made by allowing the leaves to remain in the dehydrator until they are powder dry and then rolling them between layers of cloth. Celery salt may be made by combining 1 tablespoon of celery powder with 1 teaspoon salt. The celery powder and salt may be stored in a box, can or shaker.

CORN: YELLOW OR WHITE (Sweet and Field) - Corn is best for dehydration when it reaches a medium, well-filled out stage, is tender, and contains a large amount of milk. It should be gathered early in the morning to assure freshness. After husking and trimming away any defective kernels, the ears are stacked on the steamer rack in log cabin design and steam blanched until every kernel has been thoroughly penetrated by the steam. This may be determined, after from 5 to 8 minutes, by examining kernels from the middle of the cob; the kernel should be steamed through but not cooked. Working as rapidly as possible with the hot ears, the kernels may be cut from the cob either in shoe peg or cream style: for shoe peg or whole kernel corn, one deep cutting is made; for cream style, two cuttings are made - the first, cutting the upper half of the kernel - the second, cutting deep to the base of the kernels. The corn should be distributed to a depth of 1/2" on cloth covered trays to prevent sifting through the slats in the trays and should be placed immediately in the preheated dehydrator as outlined in Step No. 1 of "Dehydration of Steam Blanched and Sulphured Foods." The temperature of the dehydrator should be maintained at 150° F. for the first 4 hours, then reduced to 135° F. for the balance of the drying period as described in Steps No. 2, 3 and 4. In order to retain the original white or yellow color of the corn, care must be taken to prevent the temperature from rising; if the temperature rises above 150° F. the corn will probably caramelize which means an undesirable charring or browning and an unsatisfactory product. Strict observance of Step 2 is very important in

drying corn as well as beans and peas, as these vegetables contain a compact, starchy tissue. Field experience indicates that undesirable case hardening will result if the humidity is released - either by opening the ventilators or the dehydrator door - before the humidity of pressure is built up in the box sufficiently to force the water out of the center of the food pieces. For corn, peas, and beans the completion of Step 2 may require from 2-1/2 to 3 hours. Drying time for corn ordinarily ranges from 7 to 12 hours but may require a longer period in individual cases. When dehydration is finished the corn resembles a piece of plastic, and is transparent on the outer edges and a bit cloudy in the center. By biting through a kernel with the front teeth, it may be determined whether the corn has dried sufficiently and uniformly. The color of dehydrated corn should be similar to the golden yellow or white of the original product. Corn should be stored in small size moisture-proof bags and sealed with a hot iron, as described in Chapter III.

CORN ON THE COB - Select desirable size ears. Husk, steam on the cob immediately until the steam has thoroughly penetrated the kernels. Usually 10 to 15 minutes, or possibly a little longer steaming time is required, depending upon the vigor of the boiling water and the quantity being steamed at one time. Load onto dehydrator trays while hot and proceed as for CORN, YELLOW OR WHITE. Sweet milk in place of water for revitalizing corn makes a better flavored product.

EGGPLANT - Eggplant to be dehydrated should be ripe, firm, fresh and highly colored. Before starting to prepare the eggplant, a salt water solution of one teaspoon salt to the pint of water - should be made in which to place the peeled eggplant. Eggplant discolors when exposed to the air because of a chemical reaction that takes place between certain substances of the food tissues and oxygen (referred to as oxidation, enzymatic reaction, or attack of enzymes). The noticeable results are the discoloration and fading of the natural color to a brown or gray. To stop this oxidation, eggplant after peeling must be placed immediately in salt water. Large or medium size eggplants should be cut in half, and one-half placed cut-side down in salt water while the other half is being peeled. A stainless steel knife must be used and the eggplant should be dipped occasionally in salt water while removing the peel in order to prevent darkening. The eggplant may be cut into 1/4" slices or 1/2" cubes. The slices or cubes should be washed in clear water before being placed in the steamer. Steam blanch until the steam has thoroughly penetrated the thickest portion of the pieces. This usually requires 7 to 10 minutes. After blanching, the eggplant

should be immediately placed on cloth-covered dehydrator trays, the cubes to a depth of 1/2", slices distributed evenly and not overlapped. Place the trays immediately in the dehydrator which has been preheated to 150° F. This temperature should be maintained for the entire drying period. The dehydration process should be carried out in accordance with Steps Nos. 1, 2, 3 and 4 as outlined in the section "Dehydration of Steam Blanched and Sulphured Foods."

Field experience indicates, depending on the product and other local conditions, that the time required for dehydration ranges from 9 to 12 hours. When dehydration is finished the eggplant should be light gray in color and crispy dry. The product should be stored in moisture-proof bags as described in Chapter III.

IRISH POTATOES - The same procedure should be followed as for eggplant.

KALE - Curly or crinkly varieties of kale dehydrate better than smooth varieties. Kale should be harvested, prepared, steam blanched, dehydrated and stored in a manner similar to that for Broccoli, as described above. In contrast to broccoli, kale will ordinarily dry in from 1-1/2 to 4 hours if the trays are not too heavily loaded.

LIMA BEANS - BUTTER BEANS - The beans should be in the green stage and well-developed. The same procedure for blanching and dehydrating should be followed as for Corn, described above and strict observance of Step 2 is essential. When dehydration is finished the beans should be bright green in color and crispy dry. When stepped on with a rotary movement of the shoe a dehydrated lima bean should grind into a powder.

MUSTARD GREENS - The dehydration process is the same as for Broccoli as described above. The drying time for mustard greens ordinarily ranges from 1-1/2 to 4 hours.

ONIONS, YOUNG GREEN - Young green onions of medium size harvested early in the morning make a good product for dehydration. The onions should be washed well and the green top trimmed to the desired length with a stainless steel knife. Steam blanching is done by stacking the onions in log cabin style on the cloth covered metal rack in the steamer. Onions will darken if they touch metal during steaming or dehydration. Dehydration of onions should be done in accordance with Steps Nos. 1, 2, 3 and 4 of "Dehydration of Steam Blanched and Sulphured Foods." The temperature of the dehydrator should be maintained at 150° F. for the first 4 hours then reduced to 135° F. for the balance of the drying period. The time required ranges from 7 to 12 hours.

Onions when dehydrated should be white and a very deep green, and should be crispy dry.

ONIONS - MATURE - Only solid portions of mature onions should be used for dehydration. After slicing the onions in rings 1/4" thick - using a stainless steel knife - they are ready to be dehydrated since no pretreatment or steam blanching is necessary. The onions may be placed in either a cold or preheated dehydrator and dehydrated in accordance with Steps Nos. 2, 3 and 4 of "Dehydration of Steam Blanched and Sulphured Foods." The temperature of the dehydrator must not rise above 150° F. during the first 4 hours and then should be reduced to 135° F. for the balance of the period. When the onions are dry they will be crisp, white in color, and almost transparent.

ONION POWDER - ONION SALT - Onion powder and onion salt may be made in the same manner as outlined for celery powder and celery salt.

OKRA - WHOLE POD - Select medium size whole okra pods. Remove the cap but do not cut into the pod. Wash, steam blanch until the steam penetrates the pod. Place on thin cloth on dehydrator tray. Dry at 150° F. until deep, dark green in color and brittle dry. 9 - 14 hours.

OKRA - SLICED - Okra for slicing may be a little more mature than for dehydrating in the whole pod. Select desirable size, remove cap, slice in one-half inch lengths, steam blanch until thoroughly wilted, place on thin cloth on dehydrator tray. 150° F. 7 - 9 hours, depending upon the tray load. Dry until brittle dry.

PARSLEY - Parsley requires no pretreatment. Field experience indicates that a more natural product is obtained by washing the parsley in salt water as for Broccoli, rinsing in plain water, and loading it directly on the dehydrator trays. The same dehydration procedure is then followed as for Kale, described above. When dehydration is finished, parsley is a clear natural green color. Parsley Powder and Parsley Salt may be made in a manner similar to that for Celery Powder and Celery Salt.

PARSNIPS - The same process should be followed as for Eggplant, described above.

PEAS - Black-eyed, Crowder, English and Whippowills - Any of the market-garden varieties of green peas will make good dehydrated products. These should be selected and prepared as for table use, blanched, and dehydrated in the same manner as Corn, described above. Strict observance of Step No. 2 is essential.

PEPPERS - SWEET WHOLE - Firm, green or red, sweet peppers make excellent dehydrated products. They should be harvested early in the morning to assure freshness. The peppers to be dehydrated whole are washed, the stems and seeds removed, and steam blanched for 10 to 30 minutes depending on the size of the peppers. Strict observance to section "Blanching Equipment and Procedure" is essential. The peppers are placed in the preheated dehydrator and dried in accordance with Steps Nos. 1, 2, 3 and 4 of "Dehydration of Steam Blanched and Sulphured Foods." The temperature should be maintained at 150° F. for the entire drying period which ordinarily requires 10 to 24 hours. When finished, the peppers should be deep dark green or deep red in color. The peppers should be placed immediately in moisture-proof bags and sealed as described in Chapter III.

PEPPERS, STRIP OR RING - The peppers should be selected in the same manner as for whole sweet peppers. It is important that the peppers sliced in 1/4" rings or strips - be cut under running water or while submerged in a bowl of water. Field experience has indicated that this is necessary to prevent oxidation and sealing of the pores. It is not necessary to steam blanch peppers cut in rings or strips; they are dehydrated in the same manner as whole peppers, described above. Dehydration ordinarily requires 7 to 10 hours.

PUMPKIN - Pumpkin should be brightly colored and firm for making the best dehydrated product. After peeling, the pumpkin is cut in strips 3/4" wide, placed in log cabin style on steamer rack, and steam blanched until each strip is thoroughly steamed - but not cooked. Care should be taken not to overlap the strips when placing them on the dehydrator trays. The pumpkin is placed in the preheated dehydrator and dried in accordance with Steps 1, 2, 3, and 4 of "Dehydration of Steam Blanched and Sulphured Foods." The temperature should be maintained at 150° F. for the first 6 hours and then reduced to 135° F. for the remainder of the period. Drying time usually ranges from 18 to 24 hours. When finished the pumpkin should be deeper in color than formerly and should be a leathery dry. It should be stored in moisture-proof bags and sealed, as explained in Chapter III.

RUTABAGAS - For dehydration, the product should be firm and highly colored. The dehydration process is the same as for Eggplant, described above. When finished the Rutabaga will be deeper in color than formerly and will be a leathery dry.

SALSIFY - Salsify or oyster plant should be well developed and ground seasoned for a good dehydrated product. It is prepared, blanched, and dehydrated in the same manner as for Eggplant, described above. When finished the product will be a grayish-white and should be leathery dry. Moisture-proof bags should be used for packaging as described in Chapter III.

SWEET POTATOES - The preparation, blanching, and dehydration of sweet potatoes are the same as for Eggplant, described above. When finished sweet potatoes will be almost transparent, deep in color, and crackly dry.

SQUASH - HUBBARD, BANANA, SUMMER OR ZUCCHINI - Wash, trim, peel off the rind (do not peel summer squash). Cut into desirable slices, pieces or wedges, proceed as for PUMPKIN.

SOY BEANS - Soy beans to be dehydrated should be harvested when the burr-like green pods are well filled. The pods may be opened easily by allowing them to stand in boiling water for 3 to 5 minutes. The beans should be shelled, and then blanched and dehydrated in the same manner as for Corn described above. Strict observance of Step 2 is essential.

TOMATOES - Select tomatoes of good color and firmness. May be sliced in one-half inch slices unpeeled or may be dipped in boiling water to loosen skins. Chill in cold water. Peel. Cut into sections. For better retention of Vitamin C, sulphur 30 minutes before drying.* See directions for sulphuring Chapter II - DEHYDRATION. SULPHURING OR BLEACHING PROCEDURE - Place on rack which has been covered with cheesecloth or other thin material. Dry to a crisp, brittle dryness. Color when finished will be of original shade. Dehydrate at 150° F. Time required from 9 - 14 hours, depending upon the thickness of the slices.

* "The Fruit Products Journal," Vol. 22, No. 4, Dec., 1942 - continued through Aug., 1943 - Articles by Dr. W. V. Cruess, Research Station, University of California, Berkeley, Calif.

TURNIPS - Turnips should be firm, well developed and sound. They are prepared, blanched and dehydrated in the same manner as for Eggplant, described above. When finished the color should be grayish white.

TURNIP GREENS - The selection, preparation, blanching, dehydration, and storage are the same as for Kale, described above.

SPECIAL INFORMATION ON DEHYDRATION OF FRUITS

Dehydration of sulphured food (fruit) is carried on in the same manner as for Steam Blanched Foods, as described in the section entitled "Dehydration of Steam Blanched and Sulphured Foods," with the exception that it is not essential to preheat (Step 1) the dehydrator for sulphured foods. Steps 2, 3 and 4 are followed in the same manner for Sulphured as for Steam Blanched Foods.

Sulphured foods should be taken from the sulphuring cabinet and placed on trays in the dehydrator. Similar to steamed blanched foods, sulphured foods are distributed evenly over the trays to assure uniform drying.

The following fruits should be dehydrated in accordance with Steps 2, 3 and 4 given in the section entitled "Dehydration of Steam Blanched and Sulphured Foods." The additional detailed information on specified fruits, presented in the following paragraphs, is based on field experience obtained at 111 participation meetings held in many localities. The drying time indicated should be considered as ranges; in any particular instance the time required is dependent on the condition and preparation of the food, the operation of the particular equipment, and the experience of the operator. It is recommended that the new operator experiment with a small quantity of each variety of fruit to determine the degree of sulphur fumes needed for the particular fruit and the correct time for dehydrating.

APPLES - Firm, green or ripe apples of both cooking and eating - not mealy - varieties make good dehydrated products. They may be peeled or sliced without peeling in 1/8" rings or wedges depending on their future use. Peelings may be sulphured and dehydrated for use during the winter months for making jelly or conserves. The procedure for sulphuring as given in the section entitled "Sulphuring or Bleaching," Chapter II, should be carefully observed in the preparation of apples as well as other fruits. Apples are sulphured approximately 30 minutes per bushel or until the dark spots disappear. Place immediately on the dehydrator tray. Apples cut in rings may be partially overlapped if placed in rows; wedges may be sloped against each other. Dehydration should be done in accordance with Steps 2, 3 and 4 of "Dehydration of Steam Blanched and Sulphured Foods." To prevent caramelization the temperature should be maintained at 150° F. for the first three hours and then reduced to 135° F. until finished. Drying time for apples usually ranges from 7 to 14 hours, depending on local conditions and equipment. When finished the apples will be white and leathery dry; apple peel will be the original color and crispy dry.

APRICOTS - Same process should be followed as for Peaches described below.

BERRIES - Dewberries, blackberries and Boysenberries when firm ripe and well-colored, make good dehydrated products. Dehydrator trays should be covered with a piece of thin cloth to prevent the berries from dropping through the slats. The dehydrating process for berries is the same as for Apples described above. When finished berries are dry on the outside with a chewy or rubbery center.

CHERRIES - Well-colored, juicy ripe cherries make a good dehydrated product. Large cherries should be cut in half and the stone removed; small cherries are left whole. Cherries are neither steam blanched nor sulphured. After the cherries have been placed on the dehydrator trays each cherry should be pierced several times with a sharp needle in order to permit a more rapid escape of moisture. Dehydration of the cherries is carried on in accordance with Steps 2, 3 and 4 under "Dehydration of Steam Blanched and Sulphured Foods." The temperature of the dehydrator is held at 150° F. for the first four hours and then reduced to 135° F. for the balance of the drying period.

Field experience indicates, depending on local conditions, a drying time ranging from 12 to 20 hours. When the dehydration is finished the cherries will be very much deeper in color and will have a glossy dry skin with a rubbery, chewy center.

FIGS - LIGHT YELLOW, BLACK-BROWN - The light yellow fig makes a nice dehydrated product if left whole. It is given a sulphur treatment of 30 minutes per bushel and dehydrated in the same manner as for Cherries described above. Black or brown figs are neither steam blanched nor sulphured, and are dehydrated in the same manner as Cherries.

GRAPES - SMALL PLUMS AND PRUNES - Seedless grapes are best for dehydrating. Select fresh, and very firm fruit which is free from blemishes. Wash, dip in vigorously boiling water only sufficiently long to check the skins. Load on cloth covered trays and dehydrate at 150° F. until thoroughly dry on outside with pliable leathery centers. Drying time depends upon the thickness of the tray load. Time required 9 - 20 hours.

PEACHES - Peaches to be dehydrated should be well ripened and highly colored. The peel may be removed either by hand peeling, using a stainless steel knife, or by using a 9 to 10 percent lye solution according to a procedure outlined in U. S. Department of Agriculture Miscellaneous Bulletin No. 524, "Commercial Dehydration of Vegetables and Fruits in Wartime" - September 1943, as follows: "Most peaches are prepared for dehydration by immersion in a 9 to 10 percent lye solution at 140° F. for 3 to 5 minutes to loosen the skins; peelings and lye are washed off under jets of water." After the peaches have been peeled and halved, and the stone removed, the same sulphuring and dehydrating process as for Apples described above is followed.

Field experience indicates that from 45 minutes to 1-1/2 hours of sulphuring treatment may be necessary to remove the oxidation or dark spots. After sulphuring, the peaches, cup side up, should be loaded immediately on the trays and not overlapped. Dehydration time usually ranges from 18 to 24 hours. When dehydration is finished the peaches will be leathery dry and of a rich orange color. Package according to Chapter III.

PEARS - The entire treatment and dehydration procedure for Apples applies to pears.

CHAPTER III

PACKAGING AND STORAGE OF DEHYDRATED FOOD

From field experience it has been found that bags of moisture-proof, heat-sealing cellophane, or simple laminations of paper and cellophane, are satisfactory unit containers for packaging dried foods. Three sizes of these bags should be available: small, 3" x 5"; medium, 5" x 7"; large, 5" x 11". These bags usually may be secured from locker plants, or information on suppliers of such bags may be obtained from REA-financed cooperatives. As soon as the drying process is completed, food should be placed in the proper size bags, care being taken to handle the foods carefully so they will not crush or break. Only a sufficient quantity for one or two meals should be put into a bag which should be sealed immediately with a hot iron.

Safeguards against insect infestation and attack by rodents are important. Insects may lay their larvae or eggs on dehydrated food that is left exposed either in the dehydrator with the ventilators or door open, or on the trays unprotected on a table. Active infestation may be sealed in the package and the food will be ruined. Packaged food should be protected from rodents by placing it in tight fitting tin containers such as syrup buckets or lard cans. Packaged food should be inspected once every week during the first two months to determine whether any moisture has collected in the food. If moisture is found, the food should be placed in the dehydrator and heated for one hour at 150° F. and then repackaged, sealed, and placed again in a dry tin container.

CHAPTER IV

PREPARATION FOR TABLE USE

The process of replacing the moisture in dehydrated fruits and vegetables is described by several terms, including revitalizing, rehydrating, reconstituting and refreshing. Revitalized dehydrated foods should not be thought of as fresh foods inasmuch as they are more nearly like a good canned product when cooked and eaten. The flavor is a bit stronger than in canned or even fresh foods. A properly selected, prepared and dehydrated product when placed in water will plump up and return to practically the original form and texture. Shoe string carrots or the ring or strip peppers, which are to be used uncooked as a decoration or in salads, should be revitalized and placed in the refrigerator to chill before using. They will not, however, crisp to any marked degree.

A satisfactory revitalized product depends not only on the conditions noted above but also on the amount and temperature of the water and the length of time the food has been soaked. Allow sufficient time to bring food back to its original appearance. String beans, for instance, may require as much as six hours to revitalize. If beans are to be served at the noon day meal, the beans should be placed in water after breakfast and allowed to remain until they are completely revitalized. Products insufficiently soaked will give a food with tough texture. On the other hand, oversoaking will cause the foods to lose flavor.

REVITALIZING FRUIT - A simple syrup, using either sugar or one of the corn syrups as a base, to give desired sweetness, may be used in place of water for revitalizing fruit. The amount of simple syrup used should be sufficient to cover the fruit necessary for a meal, add more moisture if necessary. Fruit may be served without cooking or may be cooked, if desired, in the syrup or water in which it has been revitalized. Cook slowly after the boiling point has been reached.

COOKING DEHYDRATED FOOD

Field experience indicates that when cooking and seasoning dehydrated foods, it is well to experiment with a small amount of food to determine the family tastes.

The following rules should be followed in preparing dehydrated food for table use:

1. Soak dehydrated food in cold or luke-warm water until it is plump. One or two experiments will indicate the amount of dehydrated food required for a family meal.
2. Cook in the same water in which the food has been revitalized.
3. Bring to a boil then simmer slowly.
4. Cook only until tender. Any surplus stock may be used in soup and gravies.
5. Season dehydrated foods according to the family taste in the same manner as fresh foods.

COST OF OPERATION

The cost of electricity required for the operation of an electric dehydrator may be determined in the same manner as for other items of electrical equipment. It should be kept in mind that the wattage used in the process of dehydration is usually decreased after the first two or three hours in order to maintain proper temperature. It is recommended in Chapter I, therefore, that two wattages for heating be provided; 1000 and 500 watts. An ordinary 8" fan is usually of 1/16 horsepower. On the assumption that a dehydrator has a 1/16 horsepower fan and the two recommended wattages for the heating element, the cost of electric power required for dehydrating a specific product, such as beans, may be estimated as follows:

It is assumed that a bushel of the beans selected requires 10 hours to dry. For the first two hours the dehydrator operating on 1000 watts will consume 2 KWH (1000 watts for one hour - 1 KWH). For the remaining 8 hours, on 500 watts, the dehydrator will consume 4 KWH. The 1/16 horsepower motor operating for 10 hours will use approximately 1/2 KWH. Adding these together, it is found that a total of $6\frac{1}{2}$ KWH is required to dehydrate the bushel of beans and at a rate of 4¢ per KWH the cost of the electricity would amount to 26 cents.

APPENDIX

The following reference material is a partial list of available publications relating to the dehydration of foods.

Construction and Operation of Home
Dehydrators, Rodgers, P. D., Assistant Agricultural
Engineer, TVA, Knoxville, Tenn.

Dehydration of Fruits and Vegetables and
Utilization of Dehydrated Products, Woodruff, J. G.,
Dupree, W. E., Thompson, Helen H., Georgia Experiment
Station, Experiment, Ga.

Dehydration of Fruits and Vegetables in
the Home, Bulletin No. 183, Shuey, G. A., University of
Tennessee, Knoxville, Tenn.

Drying Foods for Victory Meals, Farmers Bulletin No. 1918,
U. S. Department of Agriculture, Washington 25, D. C.

Drying Foods at Home, Agricultural Extension Service,
University of Georgia, Athens, Georgia.

Drying Fruits and Vegetables, Leaflet No. 26, Agricultural
Extension Service, Knoxville, Tenn.

Establishing a Community Food Dehydrator, State Board of
Vocational Education, Atlanta, Georgia.

Farm and Home Drying of Fruits and Vegetables, Farmers Bulletin
No. 984, U. S. Department of Agriculture, Washington 25, D. C.

Home Drying of Fruits and Vegetables with the
W. S. C. Dehydrator, Popular Bulletin No. 172, June 1943,
Agricultural Experiment Station, Pullman, Washington.

Home-Made Food Driers, Extension Circular 709, Agricultural
Extension Service, College of Agriculture, Lincoln, Nebraska.

How to Dehydrate Food at Home - Leaflet No. 60, Agricultural
Extension Service, Knoxville, Tenn.

Nutritive Value of Dried and Dehydrated Fruits and
Vegetables, Tressler, Donald K., New York State Agricultural
Experiment Station, Geneva, N. Y.

The Design and Operation of Community Food Dehydrators
as Related to Quality of Finished Product, Schaller, John A.,
Associate Agricultural Engineer, TVA, Knoxville, Tenn.

